



# THE MATHEMATICS OF OPPORTUNITY: DESIGNING FOR EQUITY

The David Brower Center

October 22, 2019

## CORE PARTNERS



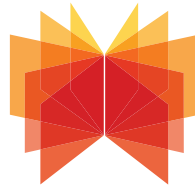
The Education Trust–West



# INAUGURAL FUNDERS



The **James Irvine**  
Foundation



**COLLEGE  
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FOUNDATION

*More Graduates for a  
Thriving California*

# **WELCOME TO THE EAST BAY!**

Regina Stanback-Stroud, Chancellor,  
Peralta Community College District



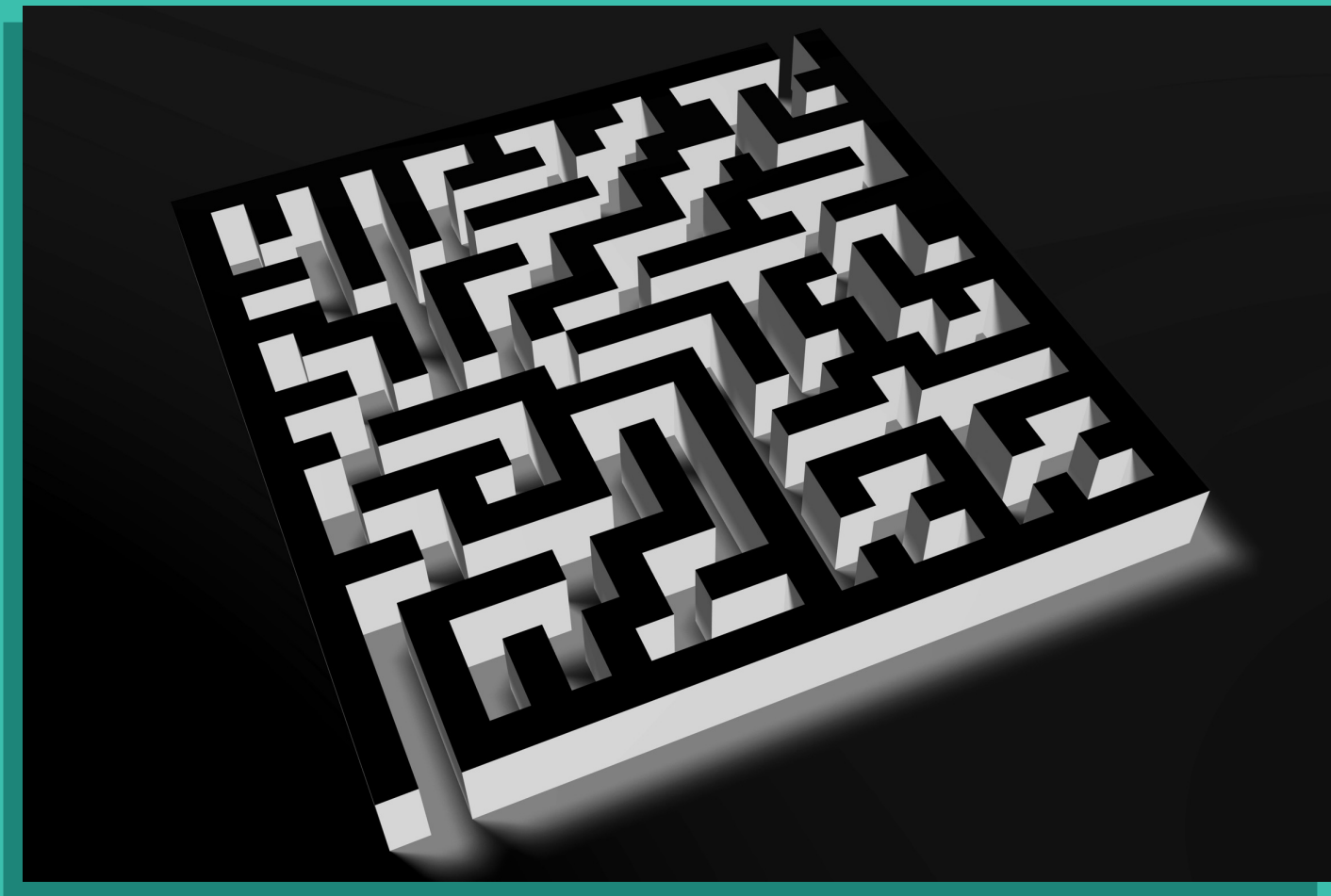


# PROBING EQUITABLE MATH PATHWAY DESIGN

Pamela Burdman, Just Equations

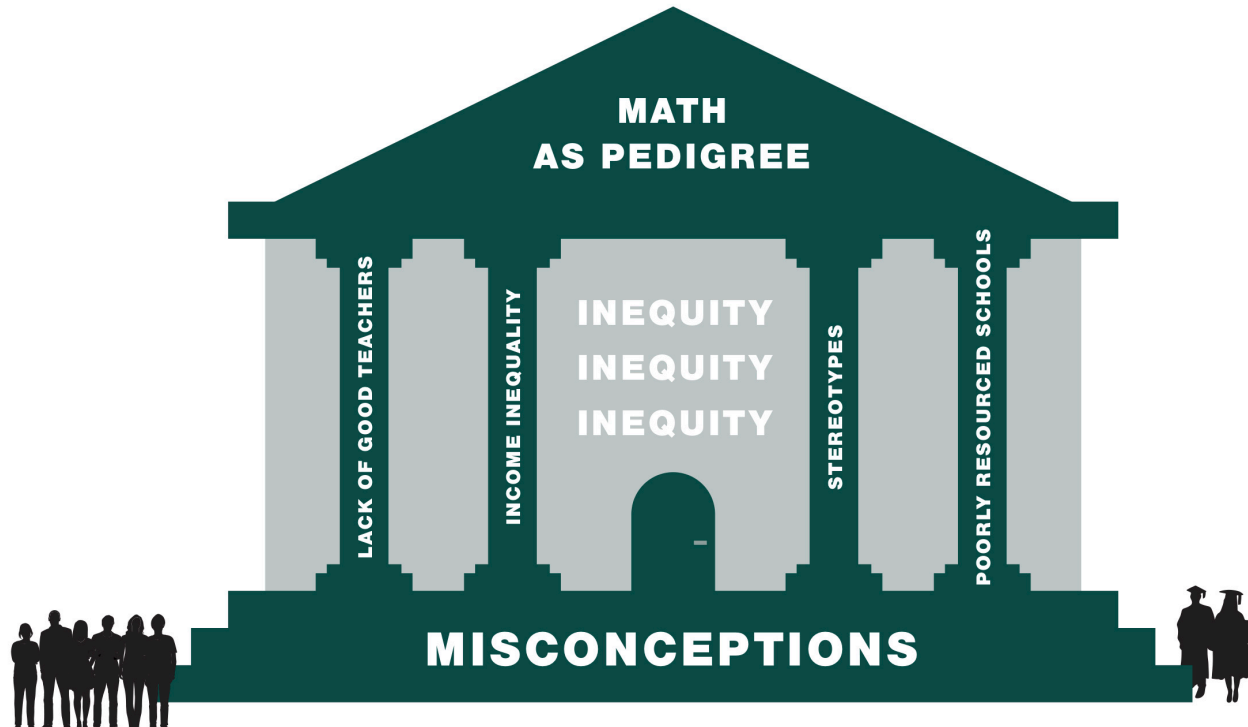








# PREVAILING ARCHITECTURE OF MATH OPPORTUNITY



# THE MATH GATE



# MATH PROBLEMS?

— ☎ Call ☎ —

1-800- $[(10x)(13i)^2] - [\sin(xy)/2.362x]$

# WHAT ABOUT THE AFTERMATH?

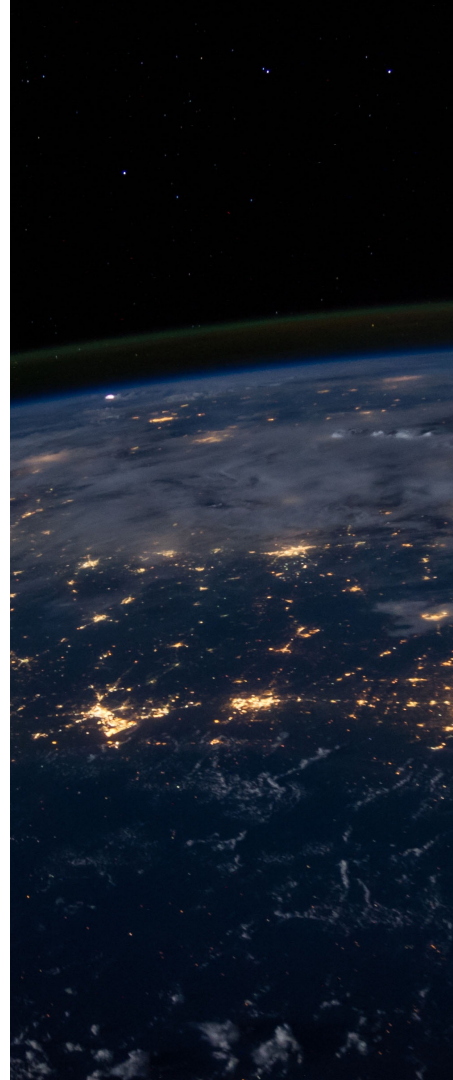


Math classroom  
experiences affect the  
choices students make  
about their futures

# PURPOSE OF MATH

- Expand professional opportunity
- Understand and critique the world
- Experience wonder, joy, and beauty

*Source: NCTM*





# JUST EQUATIONS

Re-conceptualizing the role of math in ensuring  
educational equity



## OUR GROWING NATIONAL NETWORK

- National Council of Teachers of Mathematics  
*Catalyzing Change in High School Mathematics*
- Charles A. Dana Center  
*Launch Years Initiative*
- Education Commission of the States  
*Strong Start to Finish*
- TODOS: Mathematics for All  
*Excellence and Equity in Mathematics*
- University of Chicago Center for RISC  
(Radical Innovation for Social Change)  
*Advancing data fluency*

# NEW ARCHITECTURE OF MATH OPPORTUNITY

- Redesigning postsecondary math pathways
- Re-thinking the role of math in postsecondary admissions policies
- High school math pathway re-design





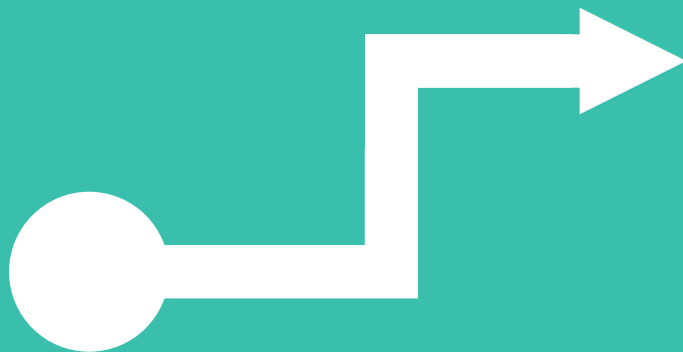
# REDESIGNING THE MATHEMATICS OF OPPORTUNITY

Principles for Equitable Math Pathways  
To and Through College



# Foundational Math

Math as a foundation, not filter, for equitable education success

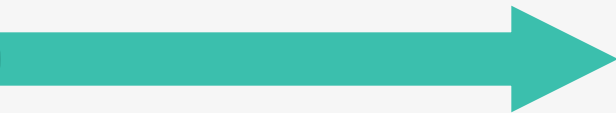




Reduced Emphasis  
on Acceleration in K-12



Resources Aligned  
to Individual Needs



Agency for Students  
in Choosing Math Pathways



# Math Pathways

Multiple options for deepening quantitative literacy,  
beginning as early as 11th grade



Rigorous Pathways Aligned  
with Student Aspirations



Rigorous, Relevant,  
and Diversified Content

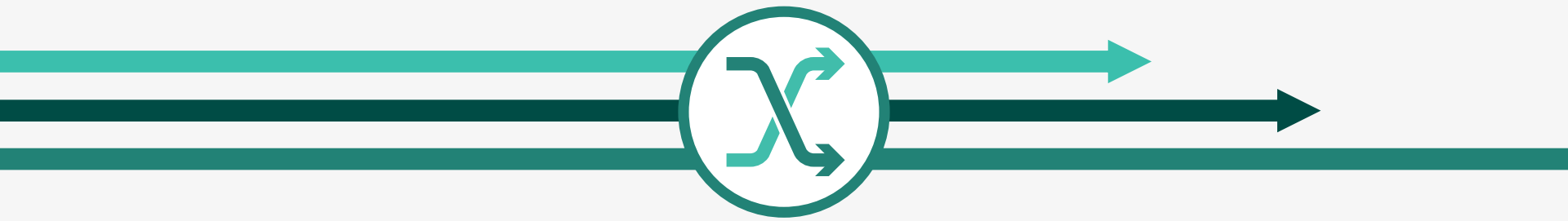


Evidence-Based  
Assessments

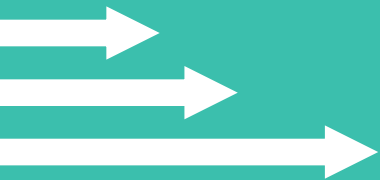


Student-Centered  
Teaching





Bridges Between Pathways



# Equitable College Opportunity

Math equity as a condition for equitable college access and success

# GOALS FOR TODAY

Advance the role of math in fostering, not limiting, equity by:

- Explore math pathway designs that enhance equitable education outcomes.
- Building a common conversation across educational segments about strategies to advance math equity
- Highlighting next steps for expanding awareness and support for implementing those strategies.





# MAKING DESIGNS WORK FOR STUDENTS

Daisy Gonzales, California Community Colleges  
Rebecca Galicia, College of Alameda/Mills College  
Mariam Shamon, Cuyamaca College



# Break

*Please be back at 10:20*



# QUANTITATIVE LITERACY AS A RIGHT (NOT A PRIVILEGE)

Robert Q. Berry, III, National Council of Teachers of Mathematics

Benjamin Duran, Central Valley Higher Education Consortium

Elisha Smith-Arrillaga, The Education Trust-West



# TAKING MEASURE

What key math pathway design feature emerged for you this morning that has untapped potential to advance equity and how?



# Lunch in the Gallery

*Please be back at 12:45*



# BRANCHING OUT: REDESIGNING HIGH SCHOOL MATH PATHWAYS FOR EQUITY

Harold Asturias, Center for Mathematics Excellence and Equity, Lawrence Hall of Science, UC-Berkeley

Phil Daro, Strategic Education Research Partnership

Jorge Aguilar, Sacramento City Unified School District

Kyla Johnson-Trammell, Oakland Unified School District



## THE PROBLEM

- Too many potential STEM students, especially Latinx and African American students, are being filtered out of opportunities.
- At the same time, too many whites, Asians, Latinxs, and African Americans are being blocked from pursuing other careers by irrelevant math hurdles.

## THE MATTHEW EFFECT

- Opportunity gaps widen over time.
- The rich get richer and the poor get poorer, in terms of math learning.



## **FALLACY OF A COMMON PATHWAY**

The most common pathway – from basic math in seventh grade through calculus in 12th – was pursued by only 3.3 percent of students. And the 20 most common pathways were pursued by fewer than a third of students.

*Source: WestEd*

“

Education systems must be able to respond as effectively to a future musician who is uninterested in traditional math courses as they would to a student who wants to be an engineer, but hasn't had a chance to take advanced math courses.

# BRANCH PATHWAYS:

New, rigorous offerings as alternatives to existing STEM-oriented math pathways for students with other interests.



# GOALS OF DESIGNING BRANCH PATHWAYS

- STEM-interested students will learn mathematics needed for STEM careers.
- BRANCH-interested students will learn mathematics needed for BRANCH careers without irrelevant hurdles.
- Latinx and African American students (and female students of all ethnicities) will have opportunities to thrive in college and expand their representation in STEM fields.
- Students who start in a BRANCH pathway will be able to switch to a STEM pathway, and vice versa.

“

Students can be offered options based on their own aspirations and interests – similar to students choosing, rather than being placed in, their college majors.

# DESIGNING PATHWAYS – NOT TRACKS

- rigorous pathways articulate with postsecondary
- more weight to student aspirations
- support for addressing the role of bias and privilege
- instruction and support to address uneven prior opportunities
- early, public, and clear communication of pathway options
- summer or semester bridge courses

“

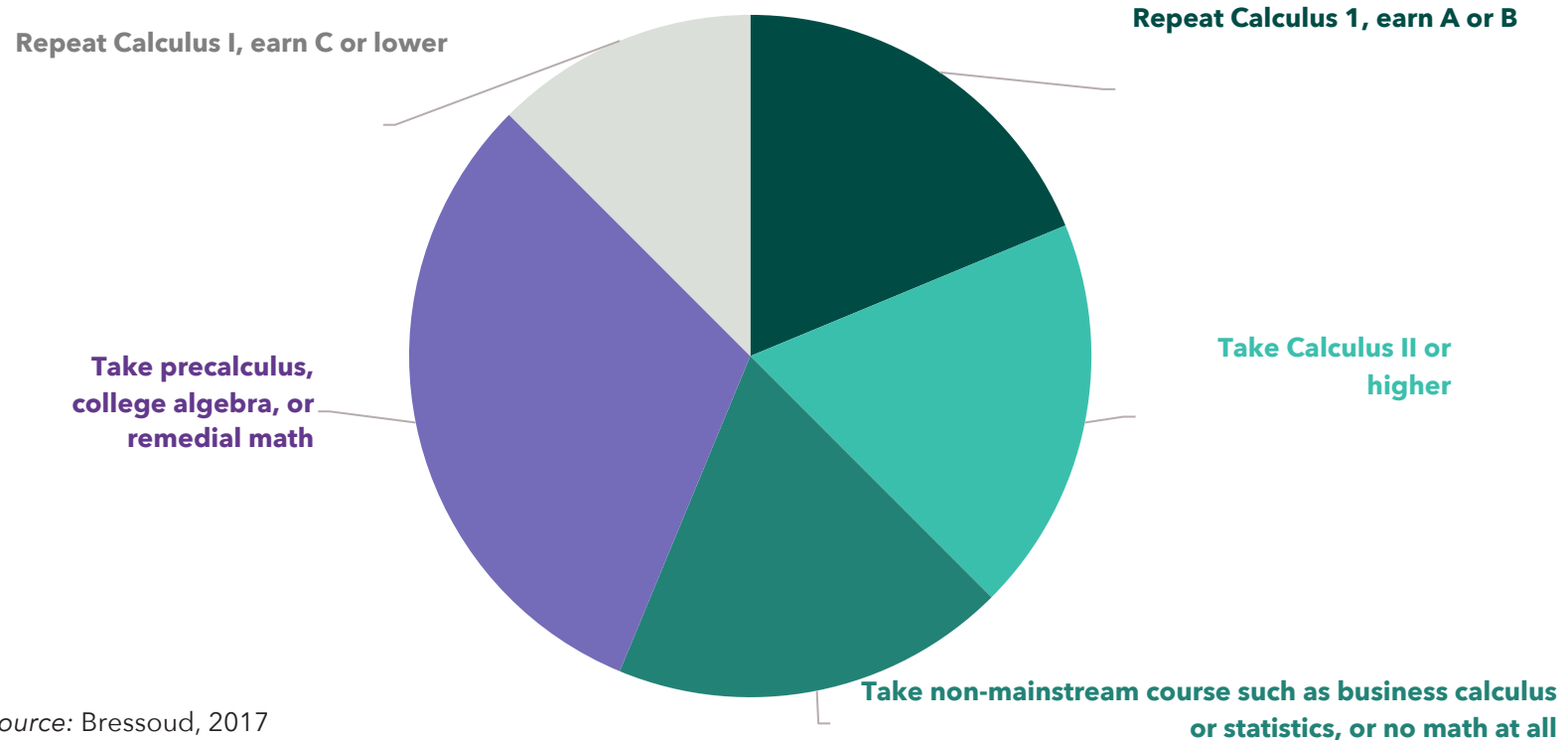
Positive academic identity and agency cannot happen without deliberate work on the part of educators to address implicit bias, assumptions about student capabilities, and the ways that math traditionally reinforces privilege.

# POSTSECONDARY POLICY CONTEXT

- College Admissions  
emphasis on Algebra 2 and Calculus



# FIRST COLLEGE MATH COURSE FOR THOSE WHO TOOK CALCULUS IN HIGH SCHOOL



Source: Bressoud, 2017

# POSTSECONDARY POLICY CONTEXT

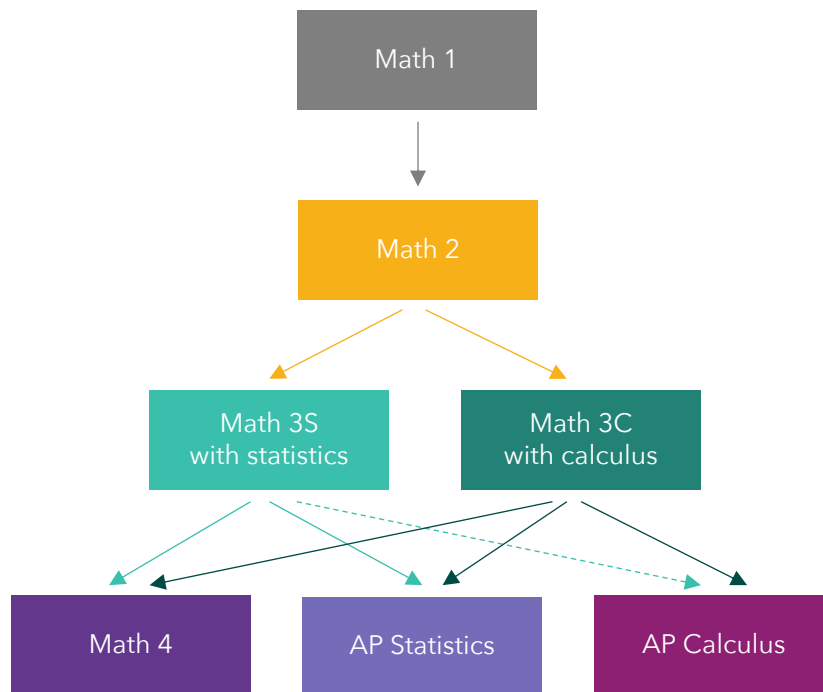
- College Admissions
  - emphasis on Algebra 2 and Calculus
- College Readiness
  - remedial requirements
  - general ed requirements and pre-requisites

# ELEMENTS OF SOLUTIONS

- pathways as **options** that lead to postsecondary opportunities, with some flexibility to switch pathways;
- **relevance** of pathway content, expertise, and goals;
- **recruitment** of students to pathways; and
- **support** for students within pathways.

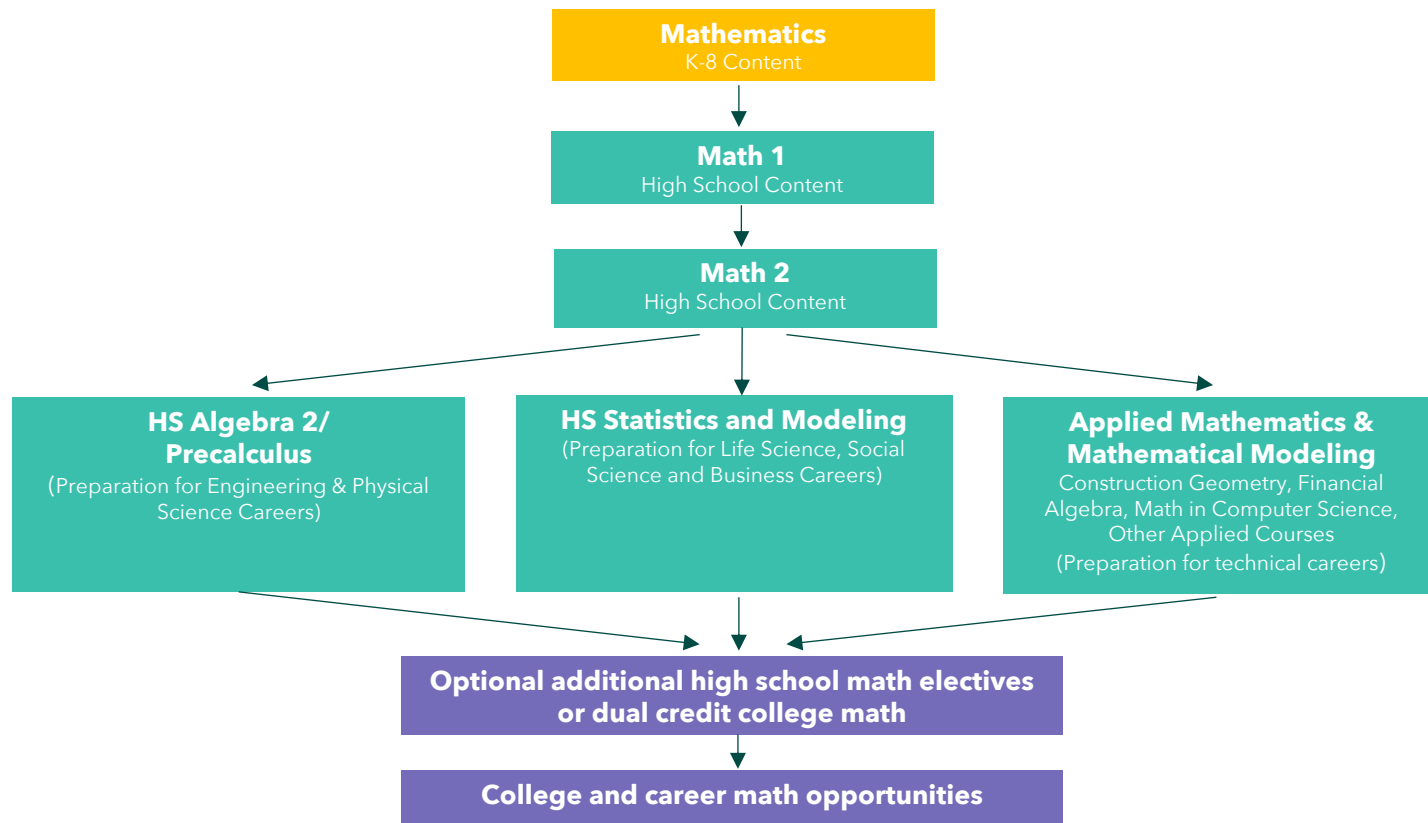
# PATHWAY OPTION

Escondido Union School District



# PROPOSED 2 + 1 COURSE MODEL

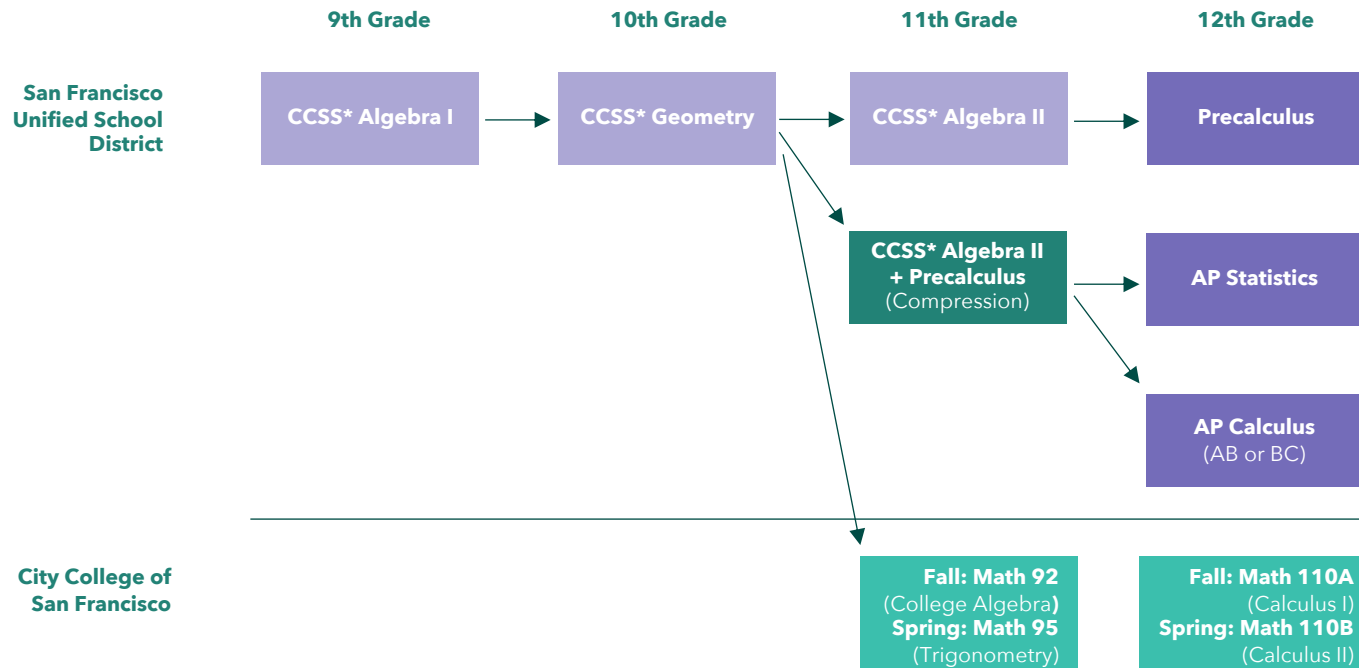
Oregon Department of Education



2 + 1 Model

# MATHEMATICS PATHWAYS

San Francisco Unified School District



# BRANCH COURSES

- an **11<sup>th</sup> grade** alternative to traditional Algebra 2.
- a **fourth-year course**.
- an **honors or AP version** of the fourth-year course that does not require acceleration.

“

To begin, we shift from thinking of pathways as tracks based on levels of student ability to thinking of pathways in terms of the valuable postsecondary opportunities they offer.



“

One key is to maintain a singular focus on the coherence of students' pathways through these institutions.

# KEY STEPS FOR BRANCHING OUT

## K-12 SCHOOLS, DISTRICTS, AND SYSTEMS

- Conduct equity audits of existing math pathway policies and practices—e.g., teacher assignments, classroom practices, grading, policies, and bell schedules—to uncover “Matthew Effect” mechanisms that widen opportunity gaps.
- Shift from tracking students by “ability” to offering pathways as options for students, while implementing strategies to dislodge preconceived notions of student abilities.
- Design ninth and 10th grade courses that prioritize content important for BRANCH pathways, while shifting more technical STEM-applicable content into junior and senior year STEM courses.
- Design junior and senior year BRANCH courses, including an AP mathematics course that seniors can take without accelerating through the curriculum, as well as junior and senior STEM courses that prepare students for calculus in high school or college.
- Support teachers, counselors, administrators, students, and families to understand the new options.

## POSTSECONDARY INSTITUTIONS AND SYSTEMS

- Adopt changes to admissions and placement criteria that support the redesign of high school math pathways (including accepting BRANCH pathway courses and reducing the emphasis on acceleration for AP Calculus).

- Ensure that prerequisites for general education quantitative reasoning courses are relevant to BRANCH courses and majors.
- Design, implement, and evaluate corequisite courses that can (a) support student success in required courses and (b) serve as bridges between STEM and BRANCH pathways for students who choose to switch pathways.
- Conduct equity audits of math pathways and corequisite math courses to ensure they are meeting equity goals by diminishing racial and socio-economic gaps.

## RESEARCH COMMUNITY

- Partner with higher education institutions to evaluate the effectiveness of new postsecondary pathways in preparing students for their chosen fields and in reducing equity gaps in college success, including enrollment disparities in STEM majors.
- Design, develop, and research practices, tools, and systems that replace “Matthew Effect” mechanisms with practices, tools, and systems that reduce equity gaps.
- Partner with K-12 to develop and evaluate new common ninth and 10th grade courses as well as new 11th and 12th grade BRANCH and STEM courses.
- Work with systems to design, develop, and evaluate student support systems and practices, including high school and college corequisite math courses.

# Deep Dive Sessions



# **ADVANCING EQUITY IN POSTSECONDARY MATH PATHWAYS (GOLDMAN THEATER)**

Rogéair Purnell-Mack, RDP Consulting

Maxine Roberts, Education Commission on the States

Myra Snell, California Acceleration Project

Benjamin Duran, Central Valley Higher Education Consortium

Moderator: Linda Collins, LearningWorks, Career Ladders Project



# **ADMISSIONS CONTEXT FOR HIGH SCHOOL MATH PATHWAYS (KINZIE ROOM A)**

**Niu Gao**, Public Policy Institute of California

**Monica Lin**, University of California Office of the President

**Monica Casillas**, Center X, UCLA

**Ravin Pan**, Sacramento State University

**Moderator: Kimberly Samaniego**, UC-San Diego



# **EMERGING HIGH SCHOOL MATH PATHWAYS (KINZIE ROOM B)**

Abi Leaf, Escondido Union High School District

Doug Sovde, Charles A. Dana Center

Osvaldo Soto, San Diego State University

Moderator: Mayra Lara, The Education Trust-West



# Break

*Please be back at 2:00pm*



# REFLECTION

What math equity issue discussed today would you or your organization like to work on or advocate for in the coming year?





# SUMMING IT UP

Christopher Edley, Jr., The Opportunity Institute,  
UC-Berkeley School of Law





**THANK YOU  
FOR BEING ARCHITECTS OF  
MATH OPPORTUNITY!**

JustEquations.org

# "Aftermath"

*Reception in the Gallery*

